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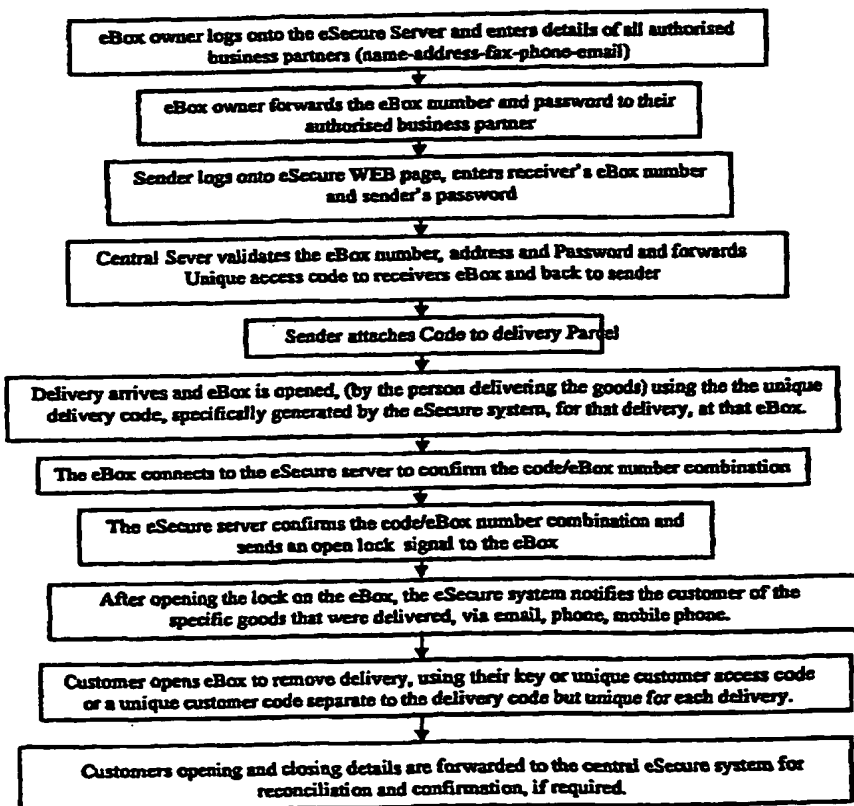
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

[Continued on next page]

(54) Title: SECURE DELIVERY SYSTEM

Business 2 Business eSecure System



BUSINESS FLOW DIAGRAM FOR ESECURE

(57) Abstract: A delivery box and associated delivery system including a locking device to govern access to the delivery box; the locking device being linked to a communication device to facilitate remote unlocking of the box; an input device in the nature of the keypad or card reader adapted to receive coded data; a modem associated with the delivery box adapted to receive and transmit data; the modem being interfaced with the input device so as to be capable of transmitting coded information from the input device to a remote location; a remote service provider having the facility to generate unique delivery codes in response to requests from retailers and/or consumers; the service provider having the capability of remotely unlocking the delivery box in response to input to the delivery box via the input device of a correct unique delivery code and transmission of that unique delivery code to the service provider via the modem in the delivery box.

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IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *With international search report.*

TITLE**SECURE DELIVERY SYSTEM****FIELD OF INVENTION**

The present invention relates to a secure delivery system for mail, packages and articles as well as apparatus necessary to perform such secure delivery system.

BACKGROUND OF INVENTION

For many years mail has been utilised to deliver letters, documents and packages although there is general recognition in more recent times that this system is only capable of providing very low security. To this end insured mail deliveries and various forms of certified mail delivery with signatures required from the addressee have been devised although the system still lacks the security necessary in the modern age. Courier deliveries have become more popular and generally a signature is required in order to accept a courier delivery. Where the addressee is a home address however a signature can often not be obtained having regard to the fact that many households now contain two working partners who are away from the premises during daylight and hence most business hours.

The advent of E-commerce has further accentuated the poor security associated with existing mail delivery systems and has inhibited the growth of E-commerce. The nature of E-commerce is that a product may

be purchased over the worldwide web but the product must still be physically delivered to the addressee. It is essential to the E-commerce merchant that receipt of the contracted articles can be confirmed. Due to the abovementioned limitations of courier mail deliveries particularly to residential addresses such confirmation is not always possible. If a signature is required for the delivery and the premises is unattended then additional cost is incurred whilst trying to effect delivery at a alternative time. Signatures are also open to fraudulent manipulation particularly as the delivery person often has no signature with which to compare the signature which he or she may receive when delivering an article.

OBJECT OF INVENTION

It is consequently an object of the present invention to provide a delivery system and associated apparatus which ameliorates one or more of the abovementioned security difficulties with existing systems or at least provides the market with an alternative.

SUMMARY OF INVENTION

According to the present invention there is disclosed a delivery system involving addressors, addressees and a service provider wherein the addressees are provided with a normally locked delivery box which delivery box is provided with an input device as well as communication means capable of transmitting messages from the input device to the service provider and also capable of receiving an unlock command from a

service provider; a unique identifier associated with each addressee's delivery box; microprocessor and electronic storage means associated with a service provider remote from the delivery box and linked to communication means; means accessible to the addressor adapted to generate a code unique to each delivery intended to be effected by that addressor through the system; the delivery box input device being capable of accepting a unique delivery code from a delivery person and in conjunction with the communication means transmitting same to the service provider for verification; reconciliation means associated with the microprocessor and electronic storage means of the service provider for verifying the authenticity of unique delivery codes received from particular delivery boxes; an electronically operable lock on the delivery box interfaced with the communication means of the delivery box such that a service provider may unlock the relevant box by transmission of a signal via the communication means to an individual delivery box in response to receipt of a correct unique delivery code received by the service provider from that box; means associated with the service provider's communication and storage means for recording the fact that a particular unique code has been utilised to open a particular delivery box.

According to another aspect of the present invention there is disclosed a lockable delivery box adapted to be placed in an accessible position; a locking device to govern access to the delivery box adapted for electronic control; an input device adapted to receive coded data; communication

means associated with the delivery box adapted to receive and transmit data; the communication means being interfaced with the input device so as to be capable of transmitting coded information from the input device to a remote location; the communication means being interfaced with the electronic locking device such that receipt via the communication means of an appropriate signal from a remote location may effect unlocking of the box.

BRIEF DESCRIPTION OF DIAGRAMS

Two embodiments of the present invention will now be described with reference to the accompanying flow charts wherein:

Figure 1 is a flow diagram indicating the steps necessary to be taken by addressors, addressees and service providers in the case where both the addressor and the addressee are businesses seeking to deliver letters or other objects to each other in a secure manner; and

Figures 2 and 3 are flow charts indicating the steps which need to be taken to effect a secure delivery in accordance with the present invention as between a customer and a retailer.

Figure 4 is a flow chart indicating the steps which may occur when utilising a system in accordance with the present invention in connection with goods which are not purchased over the Internet;

Figure 5 is a flow chart indicating the steps which may occur in accordance with the system of the present invention when goods are picked up from a secure delivery box for return to a retailer or delivery to another location;

Figure 6 is a flow chart indicating a variation on the steps disclosed in figure 5 when goods are picked up from a secure delivery box for return to a retailer or delivery to another location; and

Figures 7 and 8 are a flow chart indicating the steps which may occur when a system in accordance with the present invention is utilised by an addressee to achieve delivery to a secure box not permanently owned by the addressee.

DESCRIPTION OF PREFERRED EMBODIMENTS

Essential to the working of the system described hereafter in accordance with the present invention is the provision of a lockable delivery box at a delivery location. The delivery box may typically be located adjacent the front door to a premises much as a mail box is currently located. Alternatively groups of boxes may be centrally located in apartment blocks or warehousing situations. The delivery box can also be a virtual delivery box in the sense that it may comprise a secured area such as an area secured by a dwelling, garage or office door or even a gate. In such a

situation a garage, dwelling, office or even back yard may serve as the "box" although of course the input means and communication means would then be interfaced with the lock associated with the dwelling or office door, garage door or gate rather than that of a literal box.

The term "delivery box" where used hereafter should therefore be construed as incorporating a virtual delivery box so as to include such secure areas as lastmentioned.

The box is however biased to a locked state and is provided with communication means which will usually comprise a telephone line. Alternatively wireless communication may be provided. The communication device is associated with an input device so that direct communication is possible between the input device and a remote service provider. The communication device associated with the box is also interfaced with an electronic lock associated with the box in order that the box may receive commands from the service provider (and possibly other remote locations) instructing the lock to de-activate so as to permit access to the box. The electronic lock may be powered by battery or alternatively any other power source.

With reference now to the embodiment to which figure 2 applies it will be appreciated that the addressor is a retailer, the addressee is a customer of

that retailer and there is also a service provider interposed between these two parties.

In the case of a purchase by the customer from the retailer utilising for example the Internet a customer would order goods via a web page from the retailer. In some cases the retailer's web page could be accessed via the service provider's web page in order that the consumer may be confident that secure delivery in accordance with the present invention will be available or alternatively the customer may go directly to the web page of a retailer who the customer knows has access to the secure delivery system.

When the customer provides his identification code to the retailer the retailer is able to access the service provider's data base in order to ascertain the relevant delivery address and possibly other details associated with the consumer in order to confirm that the consumer is indeed a box holder.

When the retailer has checked that the consumer is indeed a box holder associated with the system the service provider's computer, upon the request of the retailer, generates a unique delivery code associated with a particular purchase transaction which has been entered into between the customer and the retailer. This unique delivery code is sent electronically to the retailer by the service provider and the retailer ensures that this

delivery code is attached in some way to the item to be delivered at the relevant warehousing facility.

The delivery person is instructed to go to the address at which the customer's box is located and upon arriving at the box inputs the delivery code to that box. This may be by way of swiping a bar code or physically inputting numbers into a keypad or otherwise. This keypad or other input device has a direct communication link to the service provider's computer. The service provider's computer then determines whether or not the box from which the transmission is coming is the correct box associated with the delivery code and if it is indeed the correct box then the service provider's computer system causes a coded message to be sent to that box which message de-activates the lock on that box so as to permit access to the box. The delivery is therefore capable of being completed by the delivery person.

The customer subsequently opens their box to remove the delivery utilising their own unique customer access code applicable to their box. The service provider will normally not allow multiple accessing of a box in response to one unique delivery code.

The communication means associated with the box are capable of transmitting to the service provider a record of each time the box is opened by the customer in response to a unique customer code or auxiliary

accessing means such as a key and the code which was utilised to open the box. In this way the service provider can confirm when a delivery is made and also if necessary when a delivery is actually removed from the box by a customer. These details or selected parts of these details may then be forwarded to the retailer and/or customer in order to confirm that the delivery has taken place.

With reference now to figure 2 there is disclosed a variation of the steps necessary to achieve a secure delivery which variation is more applicable to a business to business situation.

In the case of a purchase by the consumer from a retailer which is not effected over the Internet, for example in the case where the retailer is a mail order company, a customer needs to send the retailer an order form or other communication which includes their unique customer identification code and the identifier associated with their lockable box in accordance with the present invention. Once the retailer has this information the retailer is in a position to create a unique code associated with a delivery on behalf of the secure box owner and the remainder of the process is consequently the same as if the delivery of goods was initiated via the Internet as described herein. A sequence of events which may occur in connection with such non-Internet generated deliveries is set out in figure 4 hereof.

A system in accordance with the present invention also needs to provide for return of unwanted, damaged or otherwise inappropriate goods from a box holder or alternatively delivery of articles to locations remote from a box which deliveries commence at a box in accordance with the present invention.

In the case of a parcel needing to be returned to a retailer a customer holding a box in accordance with the present invention would enter a return code or pick-up code into the input device associated with his box followed by or preceded by the customer identifier and a unique access code. This unique access code would usually be the code from the original delivery which would be transmitted to the service provider to authorise the opening of the box upon the delivery person coming to redeem the unwanted goods to be returned. Two flow charts indicating the manner in which such pick-ups could be achieved in accordance with the present invention are set out in figures 5 and 6 hereof. Essentially the difference between the pick-up option one described in figure 5 and the pick-up option two described in figure 6 is that in pick-up option one the customer contacts the service provider via a computer or otherwise whereas in the example of figure 6 pick-up option two provides for the automation of the pick-up process by means of the input device and software included in the delivery box. It will be appreciated that automation of the process is relatively simple as all addresses and other relevant information will already be contained within the service provider's data base.

It will be appreciated that a delivery system in accordance with the present invention need not be restricted to instances where box holders permanently own boxes associated with their premises. A system in accordance with the present invention can be adapted so as to cover situations where persons rent or lease boxes on a temporary basis. This temporary basis may be for any time period or alternatively may be limited by reference to the number of secure deliveries which the lessee requires. In many cases a lessee may only require a box in order to achieve one secure delivery.

In such situations a person may lease one or more of a bank of secure delivery boxes all contained at a central location and available for lease from an intermediary controlling the bank of secure delivery boxes at that location.

If a customer ordering goods from a retailer for secure delivery to a secure box which is to be rented by that customer for that particular delivery does not have an identification code then a retailer could refer the customer to a relevant intermediary holding boxes at a location convenient for the customer. The customer could enter their postcode for example and the retailer's system would pass this onto the service provider. The service provider would display one or more of the closest locations whereat intermediaries were available to lease secure boxes and the customer

would choose a relevant location. The service provider would request the customer to enter their confirmation details being telephone, e-mail or address or a combination thereof. The service provider would then pass back to the retailer's system the relevant delivery address and a unique delivery code associated with the purchase being made. This unique delivery code would be sent electronically to the retailer by the service provider and the retailer would ensure that the delivery code was attached in some way to the article being delivered. Once the delivery had been executed the service provider would forward the unique access code to the customer for use when picking up the delivery. Once the customer code had been utilised the delivery box could then be made available for use by a different customer for a different delivery. A flow chart setting out the relevant steps which would need to be taken in order to effect such deliveries is set out in figures 7 and 8 hereof under the title "Casual Hire Solution".

It should be appreciated that delivery boxes may be constructed in various ways in order to accord with the intended location or type of goods being delivered. For example a delivery box may be made to be recessed into brickwork of a building in a high density area or alternatively may be constructed so as to be freestanding as would be a mail box in a typical suburban area. The delivery box may be provided with refrigeration for example if it is intended to receive refrigerated goods. The delivery box may be a virtual box which is incorporated within a front door, garage

door or gate. The system of the present invention however is applicable to all such embodiments and particularly the generation of a unique delivery/transaction identifier.

The claims defining the invention are as follows:

1. A delivery system involving addressors, addressees and a service provider wherein the addressees are provided with a normally locked delivery box which delivery box is provided with an input device as well as communication means capable of transmitting messages from the input device to the service provider and also capable of receiving an unlock command from a service provider; a unique identifier associated with each addressee's delivery box; microprocessor and electronic storage means associated with a service provider remote from the delivery box and linked to communication means; means accessible to the addressor adapted to generate a code unique to each delivery intended to be effected by that addressor through the system; the delivery box input device being capable of accepting a unique delivery code from a delivery person and in conjunction with the communication means transmitting same to the service provider for verification; reconciliation means associated with the microprocessor and electronic storage means of the service provider for verifying the authenticity of unique delivery codes received from particular delivery boxes; an electronically operable lock on the delivery box interfaced with the communication means of the delivery box such that a service provider may unlock the relevant box by transmission of a signal via the communication means to an

individual delivery box in response to receipt of a correct unique delivery code received by the service provider from that box; means associated with the service provider's communication and storage means for recording the fact that a particular unique code has been utilised to open a particular delivery box.

2. A delivery system in accordance with claim 1 hereof wherein the signal transmitted via the communication device by the service provider to unlock the delivery box is encoded.
3. A delivery system in accordance with claim 1 hereof wherein the code unique to each delivery may not be re-generated by the system in relation to a subsequent delivery until the expiry of a pre-determined length of time.
4. A delivery system in accordance with claim 1 hereof wherein the communication means for the service provider's microprocessor and electronic storage means and the delivery box comprise modems in connection with conventional data transmission pathways such as telephone lines.
5. A lockable delivery box adapted to be placed in an accessible position; a locking device adapted for electronic control to govern access to the delivery box; an input device adapted to receive

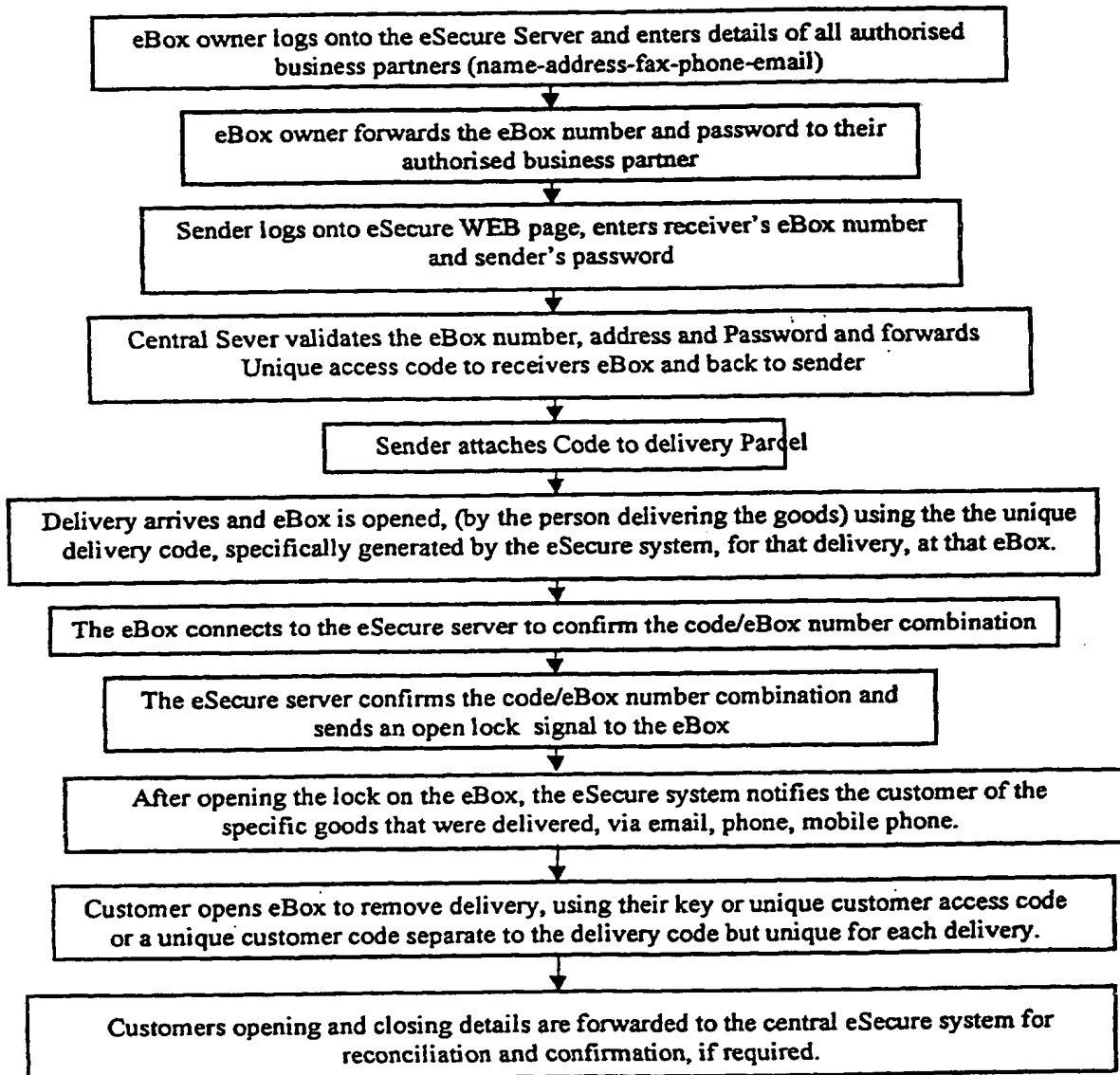
coded data; communication means associated with the delivery box adapted to receive and transmit data; the communication means being interfaced with the input device so as to be capable of transmitting information from the input device to a remote location; the communication means also being interfaced with the electronic locking device such that receipt via the communication means of an appropriate signal from a remote location may effect unlocking of the box.

6. A delivery box in accordance with claim 5 hereof wherein the delivery box is a virtual box incorporating a secure area behind a door or gate such that the locking device on the or gate becomes the locking device controlling access.
7. A delivery box in accordance with claim 5 hereof wherein the communication means comprises a modem in conjunction with conventional data transmission channels such as telephone lines.
8. A delivery box in accordance with claim 5 hereof wherein the input device is a scanning device.
9. A delivery box in accordance with claim 5 hereof wherein the input device is a keypad.
10. A delivery box in accordance with claim 5 hereof wherein the input device interfaces the communication device via a microprocessor.

11. A delivery box in accordance with claim 5 hereof wherein the input device is a card reader.

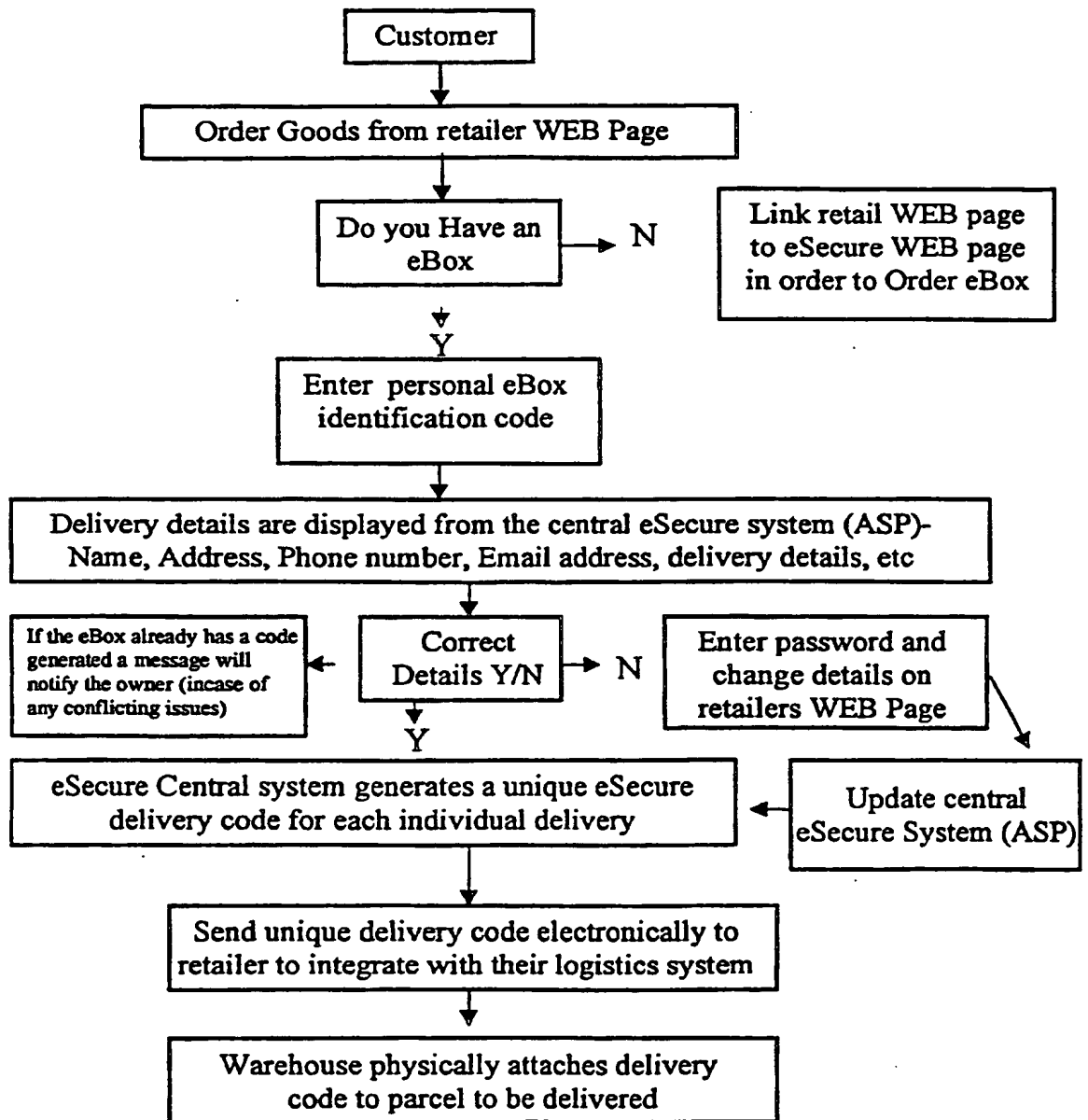
1 / 8

Business 2 Business eSecure System



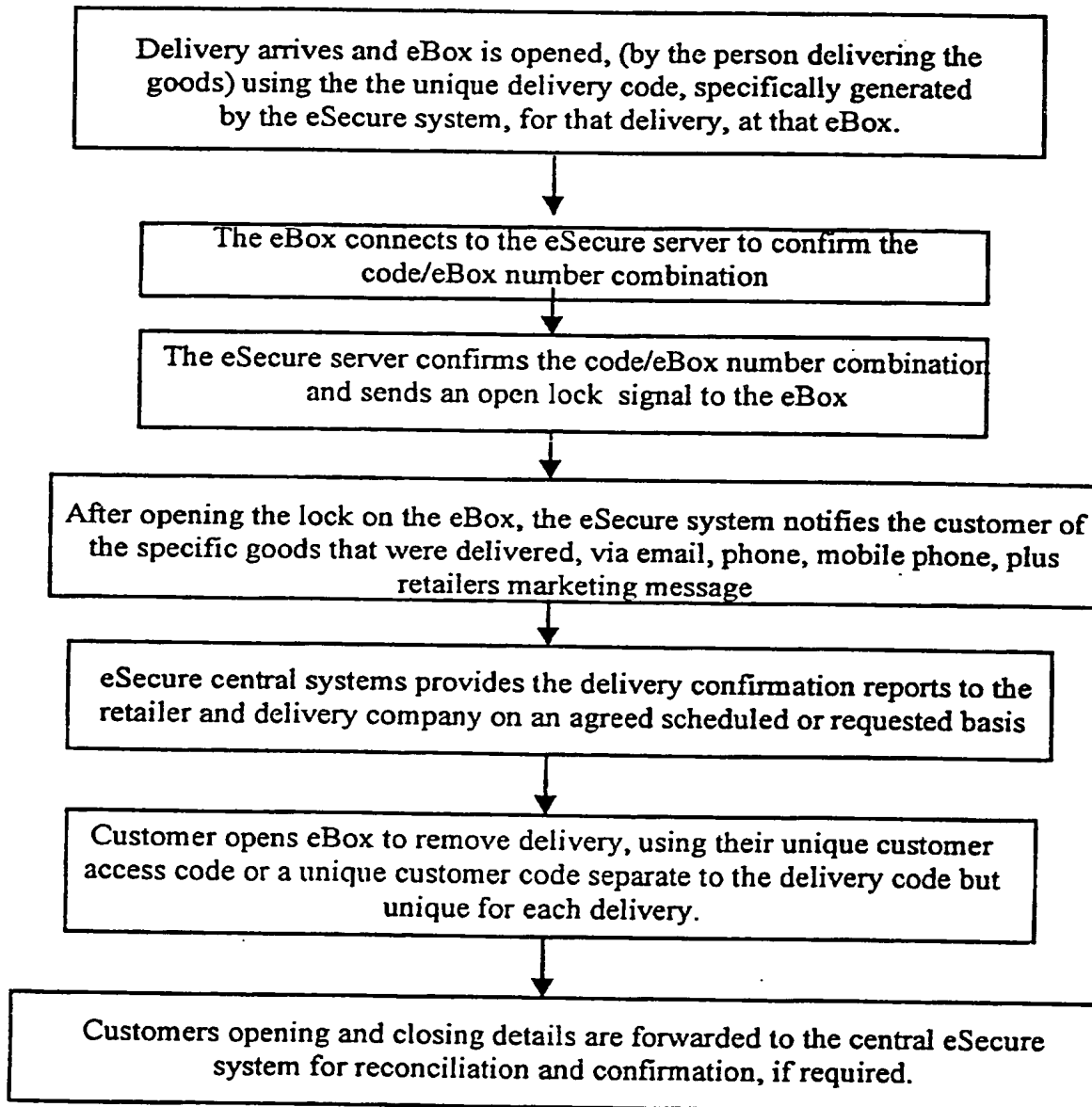
Business Flow Diagram for eSecure

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Business Flow Diagram for eSecure

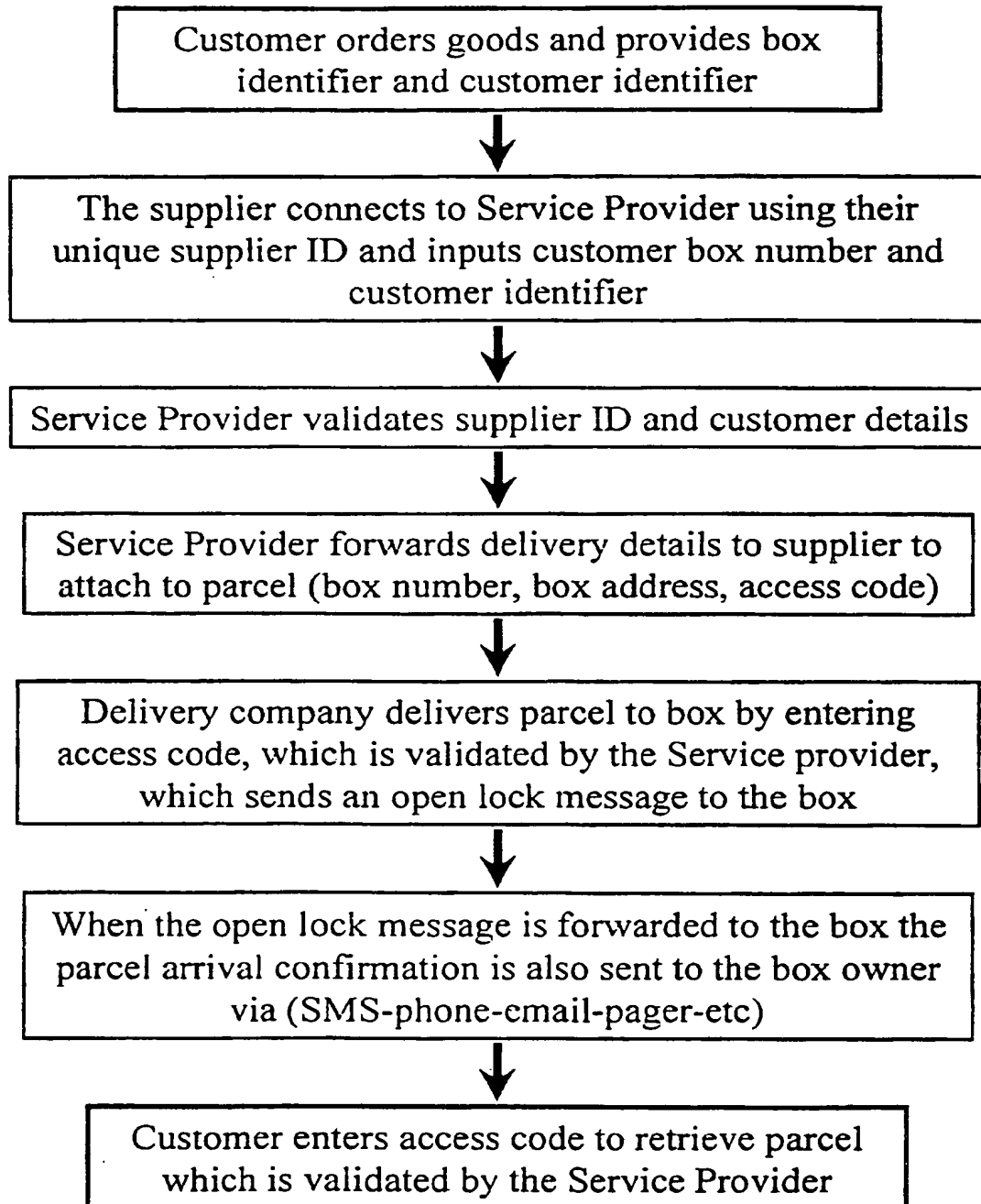
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Business Flow Diagram for Ebox

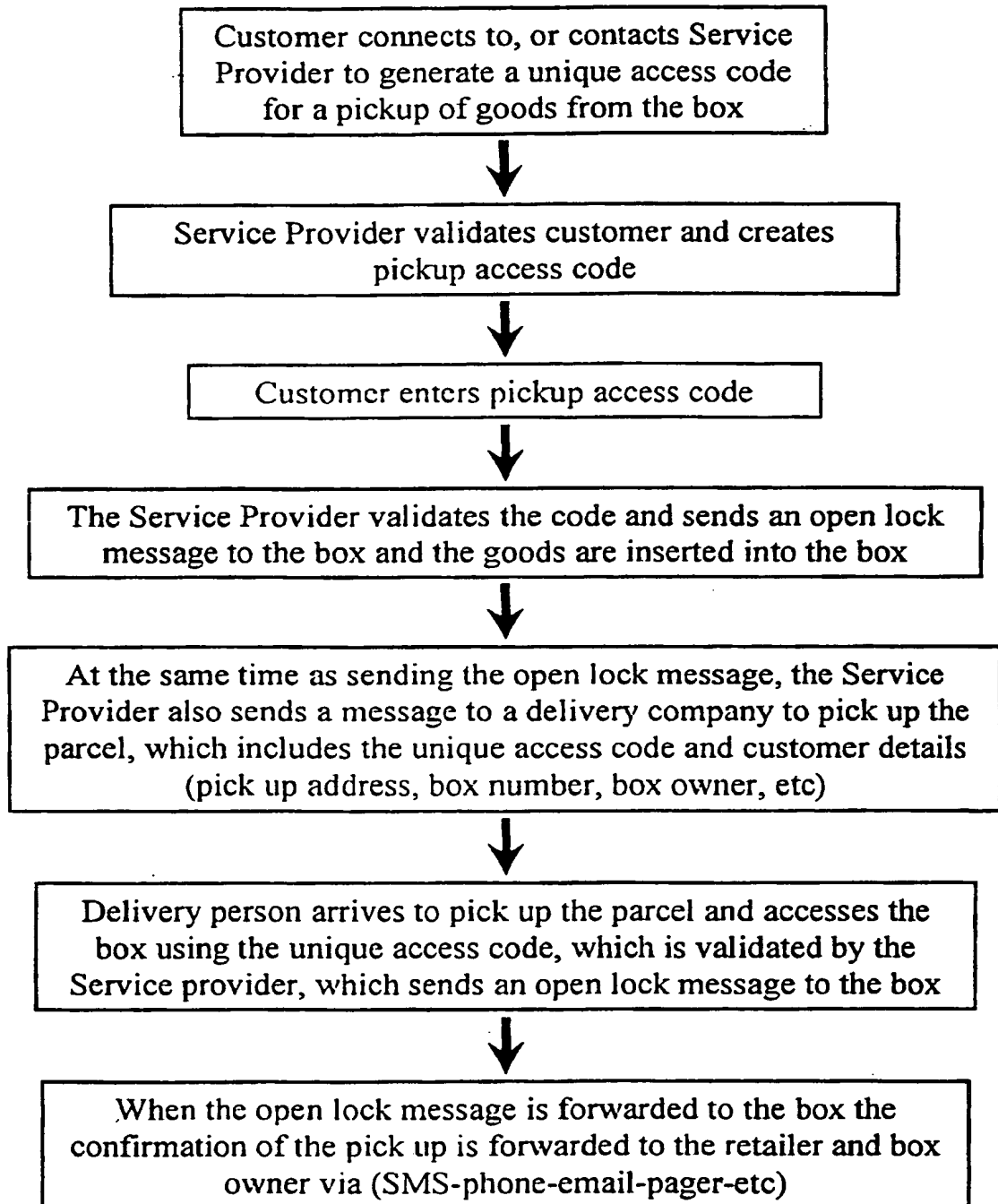
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Non Internet Solution



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Pickups option 1



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Pickups option 2

Customer enters standard pickup code which includes customers unique access code



The Service Provider validates the code and sends an open lock message to the box and the goods are inserted into the box



At the same time as sending the open lock message, the Service Provider also sends a message to a delivery company to pick up the parcel, which includes the unique access code and customer details (pick up address, box number, box owner, etc)

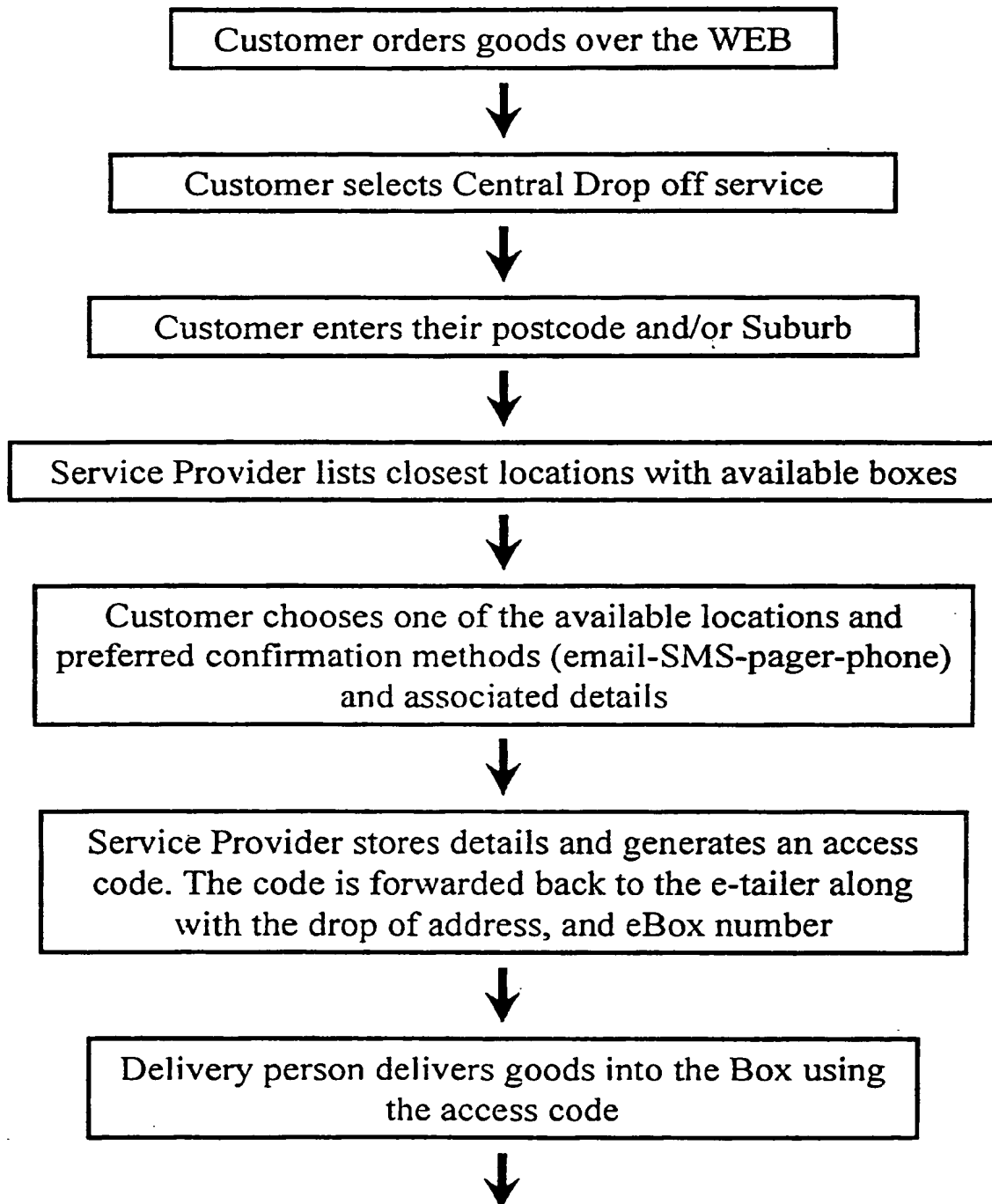


Delivery person arrives to pick up the parcel and accesses the box using the unique access code, which is validated by the Service provider, which sends an open lock message to the box

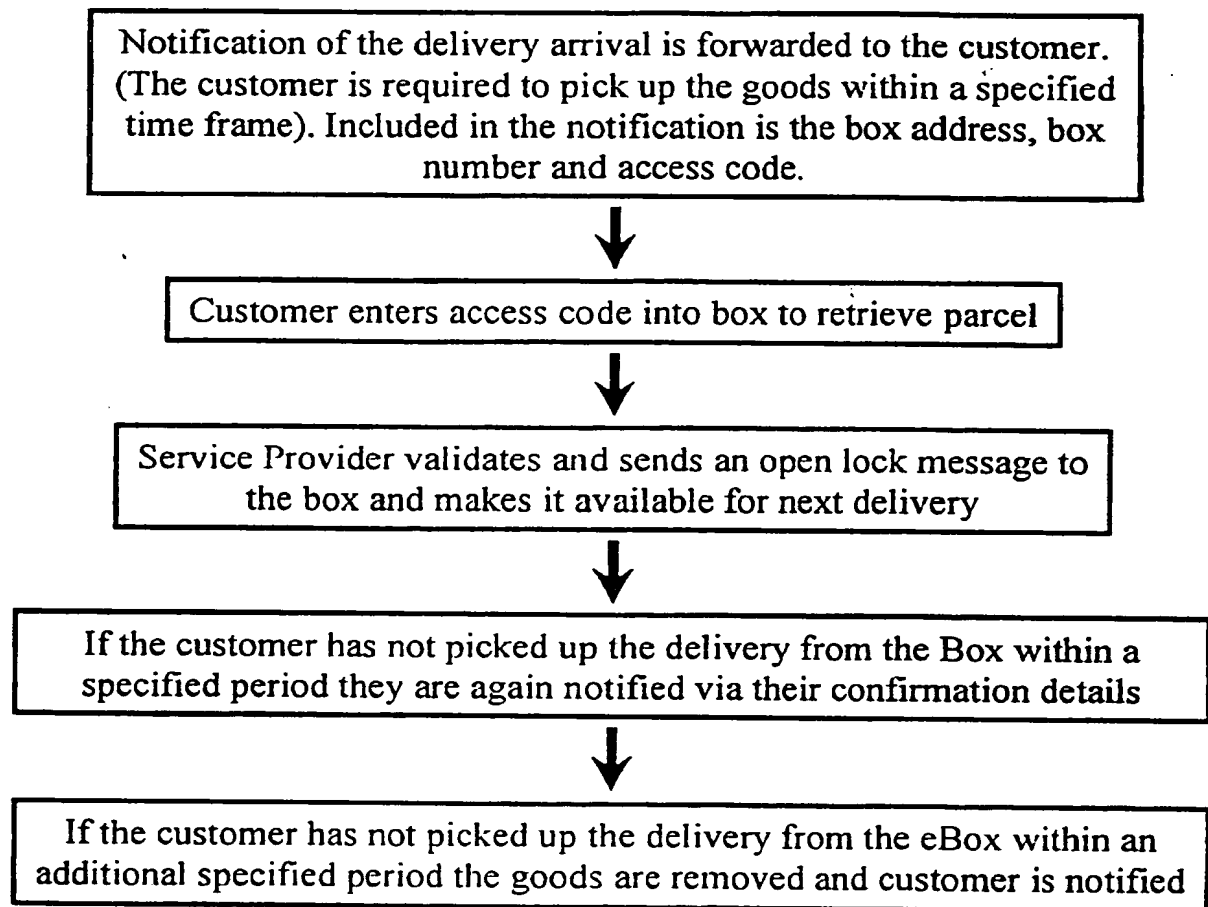


When the open lock message is forwarded to the box the confirmation of the pick up is forwarded to the retailer and box owner via (SMS-phone-email-pager-etc)

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Casual Hire Solution

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/01586**A. CLASSIFICATION OF SUBJECT MATTER**Int. Cl. ⁷: G06F 17/60, B65D 91/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPAT, USPTO, ESPACE - KEYWORDS: INTERNET, POST BOX, LOCKER, SECUR+, PASSWORD, VERIF+ ...AND THE LIKE WORDS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
T	GB, 2352073 A (INTERNATIONAL COMPUTERS LIMITED) 17 January 2001 See whole document	
A	US 6085170 A (TSUKUDA) 4 July 2000 See whole document	
A	WO 97/25694 A (SKYWIRE) 17 July 1997 See whole document	
A	US 5475378 A (KAARSOO et al) 12 December 1995 See whole document	

☐ Further documents are listed in the continuation of Box C
 ☒ See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 23 March 2001	Date of mailing of the international search report 3 APRIL 2001
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/01586

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report			Patent Family Member		
GB	2352073	NONE			
US	6085170	EP	845747	JP	10162065
WO	9725694	AU	15236/97	US	5818336
US	5475378	CA	2098973		
END OF ANNEX					

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT

REC'D 26 JUN 2001

WIPO

PCT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference GE0001P	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No. PCT/AU00/01586	International Filing Date (day/month/year) 22 December 2000	Priority Date (day/month/year) 24 December 1999
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ G06F 17/60, B65D 91/00		
Applicant GEROS, Darren Matthew et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheet(s).

3. This report contains indications relating to the following items:

I	<input checked="" type="checkbox"/>	Basis of the report
II	<input type="checkbox"/>	Priority
III	<input type="checkbox"/>	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/>	Lack of unity of invention
V	<input checked="" type="checkbox"/>	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/>	Certain documents cited
VII	<input type="checkbox"/>	Certain defects in the international application
VIII	<input type="checkbox"/>	Certain observations on the international application

Date of submission of the demand 30 May 2001	Date of completion of the report 13 June 2001
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  Stephen Lee Telephone No. (02) 6283 2205

I. Basis of the report

1. With regard to the **elements** of the international application:*
- ☒ the international application as originally filed.
- ☐ the description, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the claims, pages , as originally filed,
 pages , as amended (together with any statement) under Article 19,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the drawings, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the sequence listing part of the description:
 pages , as originally filed
 pages , filed with the demand
 pages , received on with the letter of
2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, was on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
4. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.
5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1-11	YES
	Claims	NO
Inventive step (IS)	Claims 1-11	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-11	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

Novelty and Inventive Step Claims 1-11

US 6085170

WO 97/25694

US 5745378

None of the above citations either individually or in obvious combination disclose the invention of the above claims.